

Non-CO₂ Greenhouse Gases: High-GWP Gases

Source/Sectors: Substitution of ODS/Retail Food Refrigeration

Technology: Replacing direct expansion systems with distributed systems (C.1.1.5.5)

Description of the Technology:

Distributed refrigeration features multiple smaller refrigeration units located closer to the food display cases, eliminating the need for excessive refrigerant piping throughout the store to reach a mechanical room sited away from the food, thereby, reducing leaks of HFCs. It also reduces the refrigerant charge and minimizes the need for a dedicated mechanical room containing multiple compressor racks (IEA, 2003). These systems are more advantageous compared to the conventional direct expansion systems in energy efficiency and thus, long-term cost performance (IEA, 2003).

Effectiveness: Good

Implementability: These systems have been proved to be relatively easy to operate and maintain.

Reliability: These technologies have minimal risks and uncertainties.

Maturity: Widely available and in actual use

Environmental Benefits: HFCs emission reduction

Cost Effectiveness:

Technology	Lifetime (yrs)	MP (%)	RE (%)	TA (%)	Capital cost	Annual cost	Benefits
Replacing direct expansion systems with distributed systems ¹	20	10-20	100	6-27	\$82.15	-\$6.84	\$1.58

Note: MP: market penetration; RE: reduction efficiency; TA: technical applicability; costs are in year 2000 US\$/MT_{CO2-Eq}.

1: IEA (2003) & USEPA (2001)

Industry Acceptance Level: Commonly accepted in retail food refrigeration

Limitations: Because the systems place refrigerant charge throughout the building, the potential risk of accidental refrigerant release is large; the use of flammable or highly toxic refrigerants is not feasible (IEA, 2003).

Sources of Information:

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